hospital could be saved, and attendances at hospital accident departments and surgical waiting lists could both be reduced. Perhaps the greatest advantage is an economic one, in that it costs 15 times as much to refer a patient to hospital for a minor operation as it does for the patient to be treated in general practice. In the present survey over £15 000 was saved from the hospital budget in one year.

The chief disincentive to performing minor operations in general practice is financial. While certain procedures such as immunisations, maternity services, and insertion of intrauterine devices attract a fee, there is no such provision for minor surgery. A payment of £10, equivalent to the cost of referring a patient to hospital, would not only encourage more general practitioners to undertake minor surgery, but would enable them to purchase their own instruments, equipment, and dressings.

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Medical History

Dr Samuel Johnson's movement disorder

T J MURRAY

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Summary and conclusions

Dr Samuel Johnson was noted by his friends to have almost constant tics and gesticulations, which startled those who met him for the first time. He also made noises and whistling sounds; he made repeated sounds and words and irregular or blowing respiratory noises. Further, he often carried out pronounced compulsive acts, such as touching posts, measuring his footsteps on leaving a room, and performing peculiar complex gestures and steps before crossing a threshold. His symptoms of (*a*) involuntary muscle jerking movements and complex motor acts, (*b*) involuntary vocalisation, and (*c*) compulsive actions constitute the symptom complex of Gilles de la Tourette syndrome (Tourette's syndrome), from which Johnson suffered most of his life.

This syndrome is of increasing interest recently because it responds to haloperidol, and because there are new insights into a possible biochemical basis for the tics, vocalisations, and compulsions.

> Had Johnson lived at a later date science would have been able, if not to cure his oddities at least to name them.
> Christopher Hollis[1]

The many books, diaries, and letters of Dr Samuel Johnson's friends and admirers provide an unprecedented portrait of a man, his life, and his genius. From these extensive writings as well as Johnson's own we can view the medical aspects of his life in the light of current knowledge.

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There are excellent accounts of the scrofula (the King's Evil) he suffered as a child, unsuccessfully treated by the Royal Touch of Queen Anne[2]; the recurring depression that plagued him like "a black dog of melancholy"[3]; his tics and gesticulations[4]; the stroke that left him aphasic but able to write[5]; his death in 1784[6]; and his necropsy.[7] I believe that his unusual tics and gesticulations, involuntary vocalisations, and compulsive behaviour, constitute the clinical picture of Tourette's syndrome.

In this syndrome there is sudden repetitive muscle twitching and jerking, most commonly in the face, neck, shoulders, and arms, but there may be larger, more complex motor movements and acts. The involuntary vocalisations may be mouthing sounds, breathing noises, sniffing, barking, whistling, repetitive sounds, words, or phrases, and in half of the cases sudden swearing and obscenities. These patients also manifest compulsions varying from the common rituals common to most children, such as avoiding the cracks in the pavement, to bizarre and complex compulsive behaviour. The clinical features, biochemistry, and management of this fascinating disorder were recently reviewed in a comprehensive survey.[8]

Tics and gesticulations

Johnson's tics and gesticulations often surprised and shocked those who met him for the first time, expecting his physical appearance to reflect the intellect and wit of the greatest man of that day. Instead, they observed a man, as Lucy Porter told Boswell, who "often had, seemingly, convulsive starts and odd gesticulations, which tended to excite at once surprise and ridicule."[9] Fanny Burney described him by saying,

> His mouth is almost constantly opening and shutting as if he were chewing. He has a strange method of frequently twirling his fingers and twisting his hands. His body is in continual agitation seesawing up and down; his feet are never a moment quiet; and in short his whole person is in perpetual motion.[10]

She further comments on the "cruel infirmities to which he is subject; for he has almost perpetual convulsive movements, either of his hands, lips, feet, or knees, and sometimes altogether."[11] Miss Frances Reynolds, younger sister of Sir Joshua Reynolds, noted that in her company at Twickenham Meadows his gestures were so extraordinary "that men, women and children gathered around him, laughing."[12]

When aged 27 Johnson was rejected for the post of assistant headmaster at a grammar school in Staffordshire because of his peculiar appearance and odd movements. It was thought that his involuntary motions would make him an object of ridicule with his students.[13] That same year he applied for another master's position at Solihull School but was again rejected because "he has the character of being a very haughty, ill-natured gent., and yet he has such a way of distorting his face (which though he can't help) the gent. think it may affect some young lads."[13]

Alexander Pope mentions,

> One Johnson who put in for a Publick School in Shropshire, but was disappointed. He has an infirmity of the convulsive kind, that attacks him sometimes, so as to make Him a sad spectacle.[9]

Johnson began his own school with David Garrick, later to become the great actor, as one of his few pupils. But Boswell states, "From Mr Garrick's account he did not appear to have been profoundly reverenced by his pupils. His oddities of manner, and uncouth gesticulations, could not but be the subject of merriment to them."[9]

Boswell was perhaps the most acute observer of Johnson's manner and behaviour and noted,

> That while talking or even musing as he sat in his chair, he commonly held his head to one side towards his right shoulder, and shook it in a tremulous manner, moving his body backwards and forwards, and rubbing his left knee in the same direction, with the palm of his hand.[9]

There are frequent references to his continual habit of rocking and seesawing back and forth as he sat thinking or when engaged in conversation. Johnson's student, David Garrick, who became his lifelong friend, delighted friends with impersonations of Johnson's tics and noisemaking, and even did so at Johnson's wake, although Fanny Burney indicates that it was not done in any irreverent manner.

Another interesting episode occurred when Hogarth came to see Mr Samuel Richardson, unaware that Johnson was in the room.

> While he was talking, he perceived a person standing at a window in the room, shaking his head, and rolling himself about in a strange ridiculous manner. He concluded that he was an ideot, whom his relations had put under the care of Mr Richardson, as a very good man.[9]

Sir Joshua Reynolds painted a portrait of Johnson in which he showed Johnson's fingers and hands in a twisted and contorted position; other portraits showed facial distortion and squinting. Johnson once observed Mme D'Arblay examining a small engraving from a Reynolds' portrait of himself and,

> which he no sooner discerned, than he began seesawing for a moment or two in silence; and then with a ludicrous half laugh, peeping over her shoulder, he called out: "Aha ha!—Sam Johnson!—I see thee!—and an ugly dog thou art."[12]

The numerous descriptions of Johnson's movement disorder document repetitive sudden jerking movements of his face, lips, head and neck, shoulders, arms, and legs. This twitching did not interfere with his motor ability since he was capable of occasional feats of agility and strength, and his handwriting was unaffected. The effect on his appearance was quite striking, however, and many who met him felt that they were meeting a lunatic or madman, and certainly one of the most peculiar looking individuals they had ever seen.

Reynolds mentioned that the jerking was less when he was engaged in conversations at his club and more pronounced when alone or in reverie. The isolated, purposeless muscle jerking was coupled with more complex actions, such as continuous seesawing as he sat in drawing rooms or fields, rubbing his hands repetitively on his thighs, moving his legs back and forth, and twirling his fingers, and twisting his hands. As shown in many of his portraits, his wig was often awry because of the twisting of his shoulders and the motion of his head.

The date Johnson's movement disorder started is not clear, but David Garrick was delighting friends with imitations of him when Johnson was in his early 20s.[12] The disorder persisted throughout his life, although there are few references to it in his last years, probably because his friends tended to give dramatic descriptions when first meeting him but commented little on his physical attributes as they came to know and admire him. Boswell says that his slovenly peculiarities were forgotten the moment he began to talk.

Involuntary vocalisations

While sitting in taverns or in private drawing rooms, or when walking in the streets, Johnson was often noted to moan continually, grunt, whistle, and talk to himself. Boswell writes,

> Talking to himself was, indeed, one of his singularities ever since I knew him. I was certain that he was frequently uttering pious ejaculations; for fragments of the Lord's Prayer have been distinctly overheard.[9]

Johnson's boyhood friend, Hector, remembered that even as a young man, he

> could not oblige him more than by sauntering away the hours of vacation in the fields, during which he was more engaged in talking to himself than to his companion.[9]

Although he talked to himself, he also surprised companions by blurting out meaningless and unintelligible sounds. Both Boswell and the Reverend Dr Thomas Campbell comment on Johnson's frequent tendency to make whistling sounds. Perhaps the best description of his involuntary vocalisation comes again from Boswell,

> In the intervals of articulating he made various sounds with his mouth, sometimes as if ruminating, or what is called chewing the cud, sometimes giving a half whistle, sometimes making his tongue play backwards from the roof of his mouth, as if clucking like a hen, and sometimes protruding it against his upper gums in front, as if pronouncing quickly under his breath *too, too, too*: all this accompanied sometimes with a thoughtful look, but more frequently with a smile. Generally when he had concluded a period, in the course of a dispute, by which time he was a good deal exhausted by violence and vociferation, he used to blow out his breath like a whale.[9]

Although Johnson's involuntary vocalisation was usually in the form of moaning, groaning, blowing, whistling, sighing, and deep and heavy breathing, he also talked to himself in long sentences and repeated expressions he heard as well as long phrases from poetry and literature for which his memory was legendary. Boswell noted his tendency to repeat fragments of the Lord's Prayer; when a friend was commenting on another's pretty wife, Johnson was heard to say, "Lead us not into temptation."[9] Others said that if you sat near his chair when he

was not engaged in conversation you could hear him repeating snippets of Shakespeare.

Boswell also mentioned his mouthings, vocalisations, and repetitions of phrases and poems.

> It used to be imagined at Mr Thrale's, when Johnson retired to a window or corner of the room, by perceiving his lips in motion, and hearing a murmur without audible articulation, that he was praying; but this was not *always* the case, for I was once, perhaps unperceived by him, writing at a table, so near the place of his retreat, that I heard him repeating some lines in an ode of Horace, over and over again, as if by iteration to exercise the organs of speech, and fix the ode in his memory.[9]

A tendency to echolalia, the repetition of sounds or expressions heard, was documented by Mrs Thrale. He spoke roughly to her on one occasion but she said no more than, "Oh! dear good man!" One of the ladies, concerned about the way he treated Mrs Thrale, repeated this to Johnson. He was later found lying back in his chair, appearing half asleep but repeating over and over in a loud whisper, "Oh! dear good man!"[2][12]

He was never known to swear, and had a low opinion of those who did. He once asked a man to desist from using profanities and left the room when he refused to do so.

Compulsive behaviour

Miss Frances Reynolds vividly details his peculiar and complex compulsive behaviour. She wondered why none of his biographers had noticed his tendency to repeat expressions and thoughts over and over. She also comments on his peculiar method of entering a house.

> Nor has anyone, I believe, described his extraordinary gestures or antics with his hands and feet, particularly when passing over the threshold of a Door, or rather before he would venture to pass through *any* doorway. On entering Sir Joshua's house with poor Mrs Williams, a blind lady who lived with him, he would quit her hand, or else whirl her about on the steps as he whirled and twisted about to perform his gesticulations; and as soon as he had finish'd, he would give a sudden spring and make such an extensive stride over the threshold, as if he were trying for a wager how far he could stride, Mrs Williams standing groping about outside the door unless the servant or the mistress of the house more commonly took hold of her hand to conduct her in, leaving Dr Johnson to perform at the Parlor Door much the same exercise over again.
>
> But the strange positions in which he would place his feet (generally I think before he began his straddles, as if necessarily preparatory) are scarcely credible. Sometimes he would make the back part of his heels to touch, sometimes the extremity of his toes, as if endeavouring to form a triangle, or some geometrical figure, and as for his gestures with his hands, they were equally as strange; sometimes he would hold them up with some of his fingers bent, as if he had been seized with the cramp, and sometimes at his Breast in motion like those of a jockey on full speed; and often would he lift them up as high as he could stretch over his head, for some minutes. But the manoeuvre that used the most particularly to engage the attention of the company was his stretching out his arm with a full cup of tea in his hand, in every direction, often to the great annoyance of the person who sat next to him, indeed to the imminent danger of their cloaths, perhaps of a Lady's Court dress; sometimes he would twist himself round with his face close to the back of his chair, and finish his cup of tea, breathing very hard, as if making a laborious effort to accomplish it. . . .
>
> It was not only at the entrance of a Door that he exhibited his gigantick straddles but often in the middle of a room, as if trying to make the floor to shake; and often in the street, even with company, who would walk on at a little distance till he had finished his ludicrous beat, for fear of being surrounded with a mob; and then he would hasten to join them, with an air of great satisfaction, seemingly totally unconscious of having committed any impropriety.[12]

Miss Reynolds further describes his tendency to stretch out his legs as far as possible and press on the floor as heavily as he could press,

> As if endeavouring to smooth the carpet, or rather perhaps to rumple it, and every now and then collecting all his force, apparently to effect a concussion of the floor. Mr Banks, regarding him for some time with silent astonishment, at last said, "Dr Johnson, I believe the floor is very firm"; which immediately made him desist, probably without making any reply. It would have been difficult indeed to frame an apology for such ridiculous manoeuvres.[12]

Boswell notes,

> He had another peculiarity, of which none of his friends even ventured to ask an explanation. It appeared to me some superstitious habit, which he had contracted early, and from which he had never called upon his reason to disentangle him. This was his anxious care to go out or in at a door or passage, by a certain number of steps from a certain point, or at least so as that either his right or his left foot, (I am not certain which,) should constantly make the first actual movement when he came close to the door or passage.[9]

In his appetite he was always immoderate, and found it much easier to abstain from alcohol and fast than to be temperate. Interestingly, his voracious and ill-mannered eating habits were accompanied by gustatory sweating.

There are also references to Johnson's tendency to mild self-destructive or damaging behaviour such as hitting and rubbing his legs continually, and also cutting his fingernails deeply. Boswell said, "Not only did he pare his nails to the quick, but scraped the joints of his fingers with a pen-knife till they seemed quite red and raw."[9] Some of Johnson's other compulsive habits included never walking in the cracks of paving stones and touching every post along the street or road as he walked. If he missed a post he would keep his friends waiting until he went back to touch it.

Tourette's syndrome

In 1825 Itard[14] described a strange case of a young French noblewoman who from the age of 7 had suffered from involuntary and striking muscular tics. Later, she was noted to have involuntary vocalisation and, despite her well-born station in life, uncontrollable, obscene utterances. Gilles de la Tourette[15] described her later life in 1885 and documented eight further cases of involuntary movements and vocalisation, only six of whom he personally had seen. He commented that the mental capacity of these patients was unaffected and that the swearing (coprolalia) noted in some cases was not present in all. Since then the syndrome of involuntary tics and vocalisation has been linked to his name and is now commonly called Tourette's syndrome. There is now evidence for an organic neurological basis for the disorder[16] which is treated quite successfully with haloperidol.[17]

Tourette's syndrome usually develops between ages 5 and 10 years but is often passed off initially as a nervous tic or habit spasm of childhood. The involuntary muscle movements are characterised by twitching or tics around the eyes and face, and later in the shoulders, arms, legs, and torso. The movements are often complex, multiple, and tic-like rather than just single jerks; they are brief, rapid, and purposeless. Some people with the syndrome try to convert the sudden jerky movements into purposeful movements so that they are less conspicuous, but they seldom hide the disorder successfully. The muscle twitching and jerking tend to progress during the first years and may be

followed by periods of remission or stabilisation. The muscle twitching worsens during anxiety and stress but lessens with rest or concentration, and disappears during sleep.

Involuntary vocalisation usually develops after the tics, in the form of grunts, barking, hissing, throat clearing, repeated coughing, and noisy or irregular breathing. Some patients show a tendency to repeat words or phrases or to show echolalia, repeating what another person has just spoken. The most striking involuntary vocalisation, if present, is that of coprolalia or sudden cursing and swearing.

Another common feature is compulsivity. Most patients express a sense of sudden, increasing inner tension that is relieved by the muscle movement, abnormal vocalisation, or compulsive behaviour. This inner tension may be so great that they may seek out privacy in order to swear to relieve the tension and often use public or private lavatories for this purpose. Shapiro comments that, "lavatory coprolalia" is an almost presumptive sign of Tourette's syndrome.[18] Some of our patients have repeatedly felt a need to touch other people, often on the breasts, buttocks, or genitalia, but have also expressed a need to touch doors, desks, or nearby objects. One patient felt a continual need to knock over any glass that was near. Other patients have peculiar repetitive gait rituals, particularly indoors and around furniture, and they often have exaggerated forms of common compulsions, such as touching posts and avoiding cracks in pavements.

Patients with Tourette's syndrome tend to carry out self-destructive acts including scratching or rubbing areas of the skin until they are raw, biting the nails down to the quick, and hitting certain areas of their body.[19] This suggests a possible relation to the Lesch-Nyhan syndrome, a genetic disorder of purine metabolism, and there have been patients with raised urate and Tourette's syndrome.[20]

I have mentioned only a few of the many comments about Dr Johnson's movement disorder, involuntary vocalisation, and compulsive behaviour that are the hallmarks of Tourette's syndrome. Serious Johnsonians will recall many other similar references, particularly in the writings of Boswell, Frances Reynolds, Fanny Burney, and Mrs Thrale.

Other theories

Most authors have thought that Johnson's tics and odd behaviour were either a reflection of his underlying neurotic and depressive personality, or just the expected eccentricities of a great genius. Boswell, however, believed the mannerisms were, "of the convulsive kind, and of the nature of that distemper called St Vitus's Dance; and in this opinion I am confirmed by the description which Sydenham gives of that disease."[9] Thomas Tyers agreed. "He was to the last a convulsionary . . . his gestures, which were a degree of St Vitus's Dance, in the street attracted the notice of many, the stare of the vulgar but the compassion of the better sort."[12]

Sir Joshua Reynolds seemed to support the psychogenic theory, even 200 years ago.

> Those motions or tricks of Dr Johnson are improperly called convulsions. He could sit motionless, when he was told so to do, as well as any other man. My opinion is, that it proceeded from a habit which he had indulged himself in, of accompanying his thoughts with certain untoward actions, and those actions always appeared to me as if they were meant to reprobate some part of his past conduct. Whenever he was not engaged in conversation, such thoughts were sure to rush into his mind; and, for this reason, any company, any employment whatever, he preferred to being alone. The great business of his life (he said) was to escape from himself; this disposition he considered as the disease of his mind, which nothing cured but company.[9]

Cahall thought the problem resulted from a rheumatic condition,[21] and MacKeith thought it the result of athetoid cerebral palsy.[22] Lord Brain, noting that there was no evidence of any organic neurological disorder at necropsy, thought that his movement disorder was probably a psychogenic habit spasm.[23] Hitschmann, in true psychoanalytical style, stated,

> As predisposition for his compulsive neurosis and the tic we find aggression and anality of the same high degree. We do not yet know enough about the psychogenesis of tics, but it is sure that the movements ward off or express hostile and anal impulses, following the psychic pattern of compulsive neurosis.[24]

Catherine Balderson put forward the psychoanalytical view that Johnson's "deep-rooted psychic maladjustment" was due to "unrecognised erotic ideas" in his subconscious.[25] Chase was not very patient with the psychoanalytical explanations of Johnson's tics and gesticulations and was more inclined towards an organic aetiology, noting that anoxia at birth may result in tics, mannerisms, and personality change.[26] Johnson had a very difficult birth and was not expected to survive.

In an excellent review of Johnson's tics and gesticulations, McHenry[4] suggested that tics were a spectrum that could be divided into four categories, all of which Johnson showed. He thought Johnson showed evidence of (1) simple tics or habit spasms as described by Gowers and Weir Mitchell, (2) the convulsive tics or maladie des tics convulsifs or Gilles de la Tourette syndrome, (3) co-ordinated tics or tics coordonnées, and (4) psychical tic or tic psychique with spasmodic movement and imperative ideas. This was the first mention of Tourette's syndrome that at least partly explained Johnson's movement disorder, although he did not conclude Johnson had Tourette's syndrome. Although I believe Johnson's features and symptoms are all characteristic of Tourette's syndrome, there is little doubt that the diverse range of clinical movement disorders range and blend across a wide spectrum. Although McHenry thought there did not appear to be an organic basis for Johnson's movement disorder, it is now thought that Tourette's syndrome has an organic, and probably biochemical basis.[19]

Sir Thomas Laurence, friend and physician to Johnson, also suffered from a pronounced movement disorder of his head that drew attention from all that he said. Johnson never commented on this aspect of his friend, nor on his own movement disorder. Perhaps the only exception might be his response to a lady who jokingly put her foot in the line of Johnson's hand, which was moving back and forth as he sat at the dinner table. Her shoe was knocked off and to the tittering company who recognised the joke, he responded, "I know not that I have justly incurred your rebuke. The motion was involuntary, and the action not intentionally rude."[13]

Although he had many opinions and comments on other aspects of his own health, particularly his changes in mood and his depressions, he never otherwise referred to his tics and compulsions. Boswell did overhear his response to a small child who asked, " 'Pray, Dr Johnson, why do you make such strange gestures?' 'From bad habit, (he replied). Do you, my dear, take care to guard against bad habits.' "[9]

Conclusion

It would seem that there is adequate evidence to support a diagnosis of Tourette's syndrome in Dr Samuel Johnson. There are clear descriptions by his contemporaries of involuntary tics and vocalisation and of compulsive motor acts. It did not appear to hamper his life significantly and although it did not adversely affect his intellect or functioning, it undoubtedly played no part in contributing to his great intellect and genius.

In describing and commenting on the medical problems of this great man I in no way wish to lessen his image. I am reminded that, when accused of mentioning unflattering anecdotes, particularly of an intimate friend, in his *Lives of the Poets*, Johnson remarked that this was quite appropriate when the man was dead, as it was done historically. Moreover, Johnson

said, "All knowledge is of itself of some value. There is nothing so inconsiderable that I would not rather know than not."[27]

> Such was SAMUEL JOHNSON, a man whose talents, acquirements, and virtues were so extraordinary, that the more his character is considered, the more he will be regarded by the present age, and by posterity, with admiration and reverence.[9]

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Letter from . . . Canada

Opting out

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Once again, doctors are under fire on the hustings of the federal election. This time, the issue is "opting out," or the freedom of the doctor to practise outside the national insurance scheme. The left-of-centre parties—the Trudeau Liberals and the centralist party of the Canadian labour movement (unblushingly called the New Democratic Party)—are raising the cry that "Medicare is threatened." In Canada, there are no right-of-centre federal parties in reach of medical politicians. The Tories are likely to be no more sympathetic to the doctors than their British counterparts have been, so the debate is one-sided.

Freedom to choose

But behind all the political rhetoric lies the crucial issue of how independent the medical profession should remain in modern society. In Canada, the doctors have long realised that continuing conflict over costs is inevitable, with both provincial and federal governments. The profession wants the best facilities and equipment for their patients and, of course, the high income that they think they deserve. As costs go up, all levels of government find themselves in a dilemma. Medicare is politically popular, but taxes are not. The political problem is how to give the public the medicine that they have been encouraged to think of as their natural-born right, without asking them to pay for it. Quite naturally, therefore, the politicians struggle to get the best care at cut price.

Hospitals everywhere are by far the most expensive part of the health-care system. For some years there has been a reluctance across Canada to increase the number of hospital beds. On the contrary, attempts have been made to close hospitals, but this usually runs into local political storms. Time and again, the attempt has been abandoned. Much more vulnerable are the doctors. They are high earners, and they have to negotiate their fees with provincial governments. The facts that money spent on doctors' fees is not the primary fiscal problem matters little. The percentage of the gross national product paid to doctors has gone down from 1·33 in 1971 to 1·1 in 1975. Over the decade of national Medicare—varying somewhat from province to province—it has become progressively more difficult to negotiate increased fees with provincial governments. The disposable income of doctors has gone down. Their costs have continued to rise. More and more of them are becoming dissatisfied. Their dissatisfaction shows itself in two ways.

The first is by emigration to the United States. This has increased. Between 1974 and 1978, the number of interns and residents going to the United States rose from 169 to 250. Much more important is the number of mature physicians in practice who have elected to move south. In 1974, this figure was 282; in 1978, it had risen to 663. The number of graduates from Canadian medical schools, in a similar period, has risen from 1567 to 1761, and this drain to the south now represents 40% of the output of Canadian medical schools. During the same period,

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